

VIRGINIA WILDLIFE

MAY/JUNE 2022

FOUR DOLLARS



Inside:
Good Fire on the Mountain





VIRGINIA WILDLIFE

MAY/JUNE 2022

VOL. 83, NO. 3

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Back cover: A male Eastern bluebird feeds a female during courtship,

see page 30. ©Leonard Lee Rue III



BOB SMET

Director of Outreach

I'd like to thank Ryan Brown, Virginia Department of Wildlife Resources (DWR)'s Executive Director, for this opportunity to introduce myself to the *Virginia Wildlife* family. As the new Director of the agency's Outreach Division, I'm committed to continuing to provide the breathtaking photography and engaging content you have come to expect from *Virginia Wildlife* magazine and the annual *Virginia Wildlife* calendar. It is an honor to work with a dedicated group of professionals united by a common appreciation and respect for Virginia's wildlife and natural habitats.

Wildlife and the outdoors have been an integral part of my life from an early age. Prior to joining DWR, I worked in the renewable energy, environmental, and parks and recreation fields. Each of those experiences highlighted the value of quality habitat, wild spaces, and the outdoors. The positive impact that spending time in nature has on physical and mental health can not be overestimated. Over the past two years, the value of outdoor adventure and recreation has become even more apparent.

With more than 225,000 acres under department management, DWR owns more land than any other state agency in Virginia. Our Wildlife Management Areas (WMAs) are a tremendous conservation and recreation resource. If you haven't taken the time to discover the opportunities DWR offers near your home, I'd encourage you to see what is available by visiting viriniawildlife.gov/wma. These lands are purchased and maintained with hunting, fishing, and trapping license fees and with Wildlife Restoration Funds. You can access them with a hunting, fishing, or trapping license, a Virginia boating registration, an access pass, or a Restore the Wild membership. WMAs are managed primarily for wildlife habitat, but they're also great sites for wildlife viewing and exploring the wild. We encourage the public to utilize our land and enjoy the bountiful natural resources found in each WMA.

We are fortunate to live in an area of the country with incredible ecological diversity. From the Atlantic Ocean to the Appalachian Mountains, and everywhere in between, Virginia abounds with natural treasures. DWR protects and enhances those resources through science-based species and habitat management. Your support of *Virginia Wildlife* magazine, DWR's Restore the Wild program, and other agency initiatives help fund those efforts. See how you can do your part at viriniawildlife.gov/restore-the-wild. I look forward to meeting many of you and partnering with conservation, recreation, and other diverse stakeholders to support habitat restoration and protect wildlife across Virginia. I am grateful for this opportunity and look forward to sharing my enthusiasm for conservation and all things wild. I'd ask that you do the same. Introduce a friend to the wonders of nature, mentor a new hunter, or just go for a walk in the woods. Collectively, we are creating the next generation of conservation-minded citizens. The outdoors are better together.

Providing opportunities for people to enjoy the amazing natural resources the Commonwealth has to offer is a privilege. Make it a priority to spend time on the water or in the forest in the coming months. I'll see you out there.



CONSERVE. CONNECT. PROTECT

MISSION STATEMENT

Conserve and manage wildlife populations and habitat for the benefit of present and future generations. Connect people to Virginia's outdoors through boating, education, fishing, hunting, trapping, wildlife viewing, and other wildlife-related activities. Protect people and property by promoting safe outdoor experiences and managing human-wildlife conflicts.

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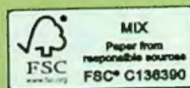
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From Our Readers



I receive many magazines from conservation agencies and organizations but I don't recall any of them that stack up with the *Virginia Wildlife* March/April 2022 issue for interesting diversity of content, quality of writing and illustration, and typography and design. Salamanders, peregrines (my favorite bird), and pollinators are of great interest to me, and you covered them well. I became a Restore the Wild Bluebird member after reading this issue of your fine magazine. Congratulations and keep up the good work that appeals to a diverse audience!

Rupert Cutler, Roanoke
Editor, *Virginia Wildlife*, 1958-1962

Rupert, thank you so much for the kind words! You set the bar high decades ago!
- Molly Kirk, editor

I just received the March/April 2022 issue of *Virginia Wildlife* magazine, and found several errors in Glenda Booth's article "Using Small Spaces to Support Pollinators." On page 27, Booth writes that monarch butterflies migrate to central Mexico's Sierra Madre Mountains to overwinter. I've visited this area and her statement is geologically incorrect.

When the discovery of the monarchs' overwintering areas in Mexico was revealed by *National Geographic*

magazine [in 1976], the article's author Dr. Fred Urquhart listed the Sierra Madre Mountains as the location in order to keep the exact location of the colonies proprietary so he could further study them, but that's not exactly where the monarch sites are.

The Sierra Madre Occidental Mountains are limestone and other sedimentary rock. Monarchs prefer to overwinter on Oyamel fir trees, which don't grow on sedimentary soils. These firs thrive in a section of geologically active mountain peaks west of Toluca and Mexico City, in the Cordillera Neo-Volcánica, which happens to link sections of the Sierra Madre Mountains together.



Also on page 27, Booth quotes many monarch websites, including USFWS, that state "the monarch is the only butterfly that regularly has a two-way migration." Technically, it's the only KNOWN butterfly species that does. There are small, more difficult to catch, tag, and release butterfly species that have been the subjects of few or no studies to confirm or eliminate the two-way migration possibility. Never underestimate what an insect can do!

To balance this email out, I want to address some other articles: I liked the article "A Search for the Living Jewels

of the Appalachian Mountains," a lot, though I'm declaring bias as J.D. Kleopfer was a former coworker of mine. I loved the great photos of animals most folks don't get to see or admire close up unless they look hard. It's tough being small and cold-blooded on this planet, and the more you learn about herps, the more fascinating they get. Adding the article on salamander photography later in the same issue was icing on the cake, thank you!

As for the article "Keeping up with the Peregrines," years ago I had the great opportunity to handle a peregrine for education programs at the Virginia Living Museum. What a thrill to turn the page to that great photo—a jolt of good memories. They are so impressive and beautiful. Love watching the falcon cam and long may they fly free.

This is probably the best issue of *Virginia Wildlife* I've read, with all the articles piquing interest. Thanks for your work on it and for your continuing raising of the bar.

Judy Molnar, Newport News

Judy, thank you for the further insight about monarch butterflies, and for the kudos. Much appreciated!

- Molly Kirk, editor



We want to hear from you! We welcome letters to the editor, questions for our staff, photos you capture of wildlife, and experiences you want to share. Please include your name and address when you send correspondence to editor@dwr.virginia.gov via email or by mail to Editor, *Virginia Wildlife*, P.O. Box 90778, Henrico, VA 23228-0778. Correspondence chosen for publication may be edited for clarity and/or length.

Connect with Us!



GOOD FIRE ON THE MOUNTAIN

By Ron Messina/DWR

A wall of smoke and fire rolling across a Virginia mountain-top is normally a sight to stoke fear in nearby hikers and send local firefighters scrambling for their brush trucks. But this fire, ignited intentionally at the Virginia Department of Wildlife Resources' (DWR) Goshen and Little North Mountain Wildlife Management Area (WMA) by a professional crew using drip torches, two-way radios, and ATVs outfitted as fire engines, is neither out of control nor meant to run wild.

It's a prescribed fire—using carefully located firebreaks and thoughtful ignition patterns to reduce undesired plants, leaves, and debris. This creates patches of bare ground that are essential for many wildlife species and allows essential sunlight to reach seeds, beginning a cycle of new growth on the landscape.

Both wildfire and using fire intentionally have had impacts on wildlife ecosystems for hundreds of years. There's evidence that indigenous people and colonial settlers alike conducted controlled burns of certain areas for many reasons—from attracting wildlife to an area to clearing land for crops or establishment of home sites. During the early part of the 20th century, with increased residential development in wooded areas and a shift in attitudes toward wildfire—including the rise of the "Smokey the Bear" campaign to prevent wildfires—fire suppression became more of a priority than use of prescribed fire.

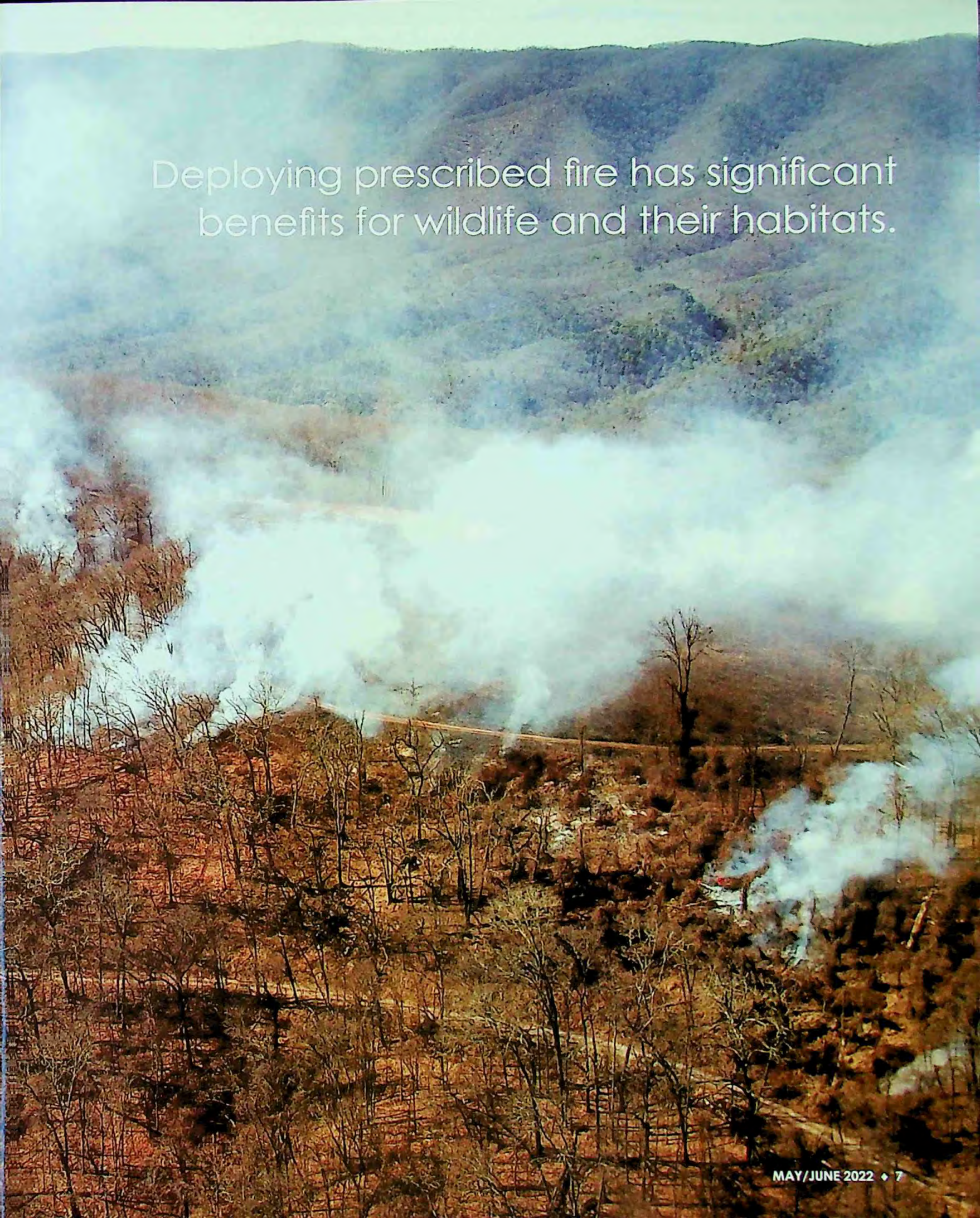
At the firing boss' signal, a row of igniters wearing full protective gear—colorful hardhats and shirts and pants made of fire-resistant Nomex® fabric—step forward to light a long line of fire. Flames erupt behind them in the thick field of low shrubs and small trees. These first flames are lit against the wind and burn slowly into the designated burn area, called the burn unit. Eliminating fuels near the fire line increases the safety factor. This technique is referred to as a "backing fire." Far down below, another line of fire is lit. This fire moves quickly with the wind, burning across the meadow in a matter



Robert B. Clontz

Smoke rolls across the mountain during a controlled burn on Gathright WMA. Inset: Igniters in protective gear light a line of fire.

Ron Messina/DWR



Deploying prescribed fire has significant
benefits for wildlife and their habitats.

of minutes with a loud crackling sound and sending smoke high into the sky. When the main fire meets the backing fire, they both begin to stall out, just as planned.

The burned and blackened mountainside may be startling to view, but within a matter of weeks it will change. Lush new growth will rise from the ashes, providing food and shelter for butterflies, songbirds, white-tailed deer, wild turkey, and a multitude of other species. Goshen's unique, high-elevation ecosystem of native grasses and flowers will again bloom and thrive. The fire will have done its job.

A Conservation Tool Like No Other

The conservation community calls it "good fire," and it's a stunningly effective tool for stewards of the land to deploy to enhance habitat.

Burning the earth in order to improve it might seem counterintuitive at first, and the fire crew setting the land ablaze might resemble some post-apocalyptic nightmare from Ray Bradbury's novel, *Fahrenheit 451*. But this isn't science fiction—it's tried and true wildlife habitat management that's being used increasingly on the landscape here in Virginia by DWR alongside a number of partner organizations and private landowners.

Walking out of the smoke along a burn line, Hunter Ritchie, the Wildlife Area Manager (WAM) in charge of DWR's Highland County WMA, surveys the area and checks in with his team via radio. Communication between all members of the fire crew is essential. A hotspot detected on a flank line by one of the spotters is quickly extinguished to keep the fire contained to the target area of the burn unit. The mountain buzzes with activity as ATVs cruise the perimeter and firefighters on foot rake hot embers.

Ritchie directs and participates in many prescribed fire events in his area, the mountainous tracts of Highland, Goshen, and Gathright WMAs in western Virginia. He says fire can have a transformative effect on the land.

"Sometimes you'll burn and then see some awesome stuff, like some of the native flowering plants and grasses that were never planted. They were there in the soil, in the seedbed, dormant for decades," Ritchie said. "You run a fire through there and the following spring those wildflowers just blow up! There are colors and sounds and bees everywhere. It's hard to imagine when it's just been burned; it's a real leap of imagination."

Fire works transformative magic even on smaller parcels in eastern Virginia. DWR Upland Game Bird Biologist Mike Dye, a fire team member who works in the Piedmont, says using fire on the landscape in tactical ways produces quick results.

A prescribed fire in Big Woods WMA. Insets from top down: Walking along a burn line to survey the area; the burn crew gets together to discuss strategy before the burn; at Goshen and Little Mountain WMA the area is checked for hot spots after the fire. Far right: a corn snake crawls over a recently burned area, hunting for food.

Meghan Marchetti/DWR



Meghan Marchetti/DWR



Ron Messina/DWR



Meghan Marchetti/DWR





"Lush new growth will rise from the ashes providing food and shelter for butterflies, songbirds, white-tailed deer, wild turkey, and a multitude of other species."

"On the Mattaponi WMA [in Caroline County], we did a prescribed fire that was only 50 acres, but within four weeks of that burn we had quail in that unit calling and trying to find mates," Dye said. "It was very obvious that it was a result of the burn—so many more quail were in that one area versus the other areas that were similar habitat that had not been burned."

Animals are quick to take advantage of any changes to their environment. Sightings have been documented of wild turkeys scratching up and feasting on roasted insects that have been exposed on still smoldering ground only hours after a fire. Wildlife are generally pretty well adapted to fire, especially lower intensity prescribed burns. Providing avenues for wildlife escape during burns is something burn managers take into consideration. There can be some short-term impacts to wildlife, but many species will take advantage of the newly rejuvenated habitats, and the improved habitat will better support many species as they work to survive and raise young.

"The effect of fire for habitat work is something that can't really be replicated in any other way," Dye said. "We can't get out there with a tractor and just dig the area and have the same effect. We can't get out there with chainsaws and have the same effect as far as habitat manipulation. It's just kind of its own entity; it's part of what these ecosystems were historically."

Restoring the Longleaf Pine Savanna

DWR's Habitat Education Coordinator, Stephen Living, agrees. "All of these habitats are fire-adapted. This was an ecosystem in which fire occurred naturally and was for thousands of years introduced by indigenous peoples," he said. "We're just bringing that back on the land."

At DWR's Big Woods WMA in Sussex County, Living kneels down to examine the effects of a fire on a native tree, the longleaf pine. He points to a few blackened pine needles along the base of a sapling. "You can see where fire burned through here, killing off the competition for this tree, but the longleaf has adapted to fire so it doesn't really impact it," he noted. Indeed, the marble-sized green buds on the longleaf sapling are unfazed, while the grasses and woody vegetation around it are gone.

Virginia's conservation community is making a unified effort to restore the longleaf pine, a tree Living calls "iconic."

In colonial times, when longleaf pine savannas ranged throughout coastal southeastern Virginia, the tall, straight trees were cut for lumber, to make turpentine and pitch, and used for masts on sailing ships. Today they're valuable for another reason—helping spur the restoration of pine savannah in Virginia. Longleaf pine are fire-dependent even as young seedlings. Managing these stands with prescribed burning helps to create incredibly biodiverse habitat. Mature longleaf

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Longleaf pine is a fire-dependent tree and recovers easily after a blaze. Insets from top down: After a prescribed burn, longleaf pine seedlings are planted in an effort to restore them to their original numbers. Far right: Prescribed fire helped create habitat needed by the federally endangered red-cockaded woodpecker.



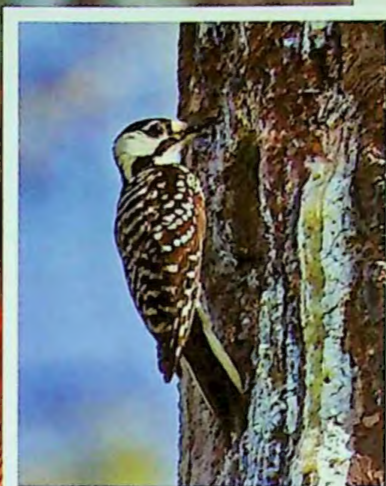
Matt Kline/DWR



Matt Kline/DWR



Robert B. Clontz



Lynda Richardson/DWR

pine are also the preferred nesting tree for the state- and federally-endangered red-cockaded woodpecker (RCW). These rare birds nest exclusively in old-growth pines and forage for insects along their bark. Currently, all of Virginia's RCW are nesting in large mature loblolly pine, but we look forward to the day when we once again have RCW in longleaf pines.

DWR Region 1 Lands and Access Manager Matt Kline oversees the Big Woods WMA. He says he was surprised after DWR and partners conducted the very first burn there because he was certain "we still had some time before the red-cockaded woodpeckers would show up." But that wasn't the case—if you burn it, they will come.

"After introducing fire, we already had some RCWs exploring in there. It doesn't happen that way often in science, but it was kind of set up in a good position to have emergent growth that that species needed," Kline said.

The RCW may be a marquee species at Big Woods, but fire also supports many animals in a pine savanna. Quail, wild turkey, deer, and songbirds like the prairie warbler all do well in a habitat with grassy understory and open spaced trees. The fires at Big Woods control the growth of some less desirable hardwoods—sweet gum and red maple, primarily.

According to Living, fire can be a reset to the soil, reducing fuel loads and thereby lessening the chance of a wildfire, while also encouraging the germination of plants that feed and shelter a diversity of wildlife. "You're reducing what we call the standing dead biomass—that heavy stuff that might inhibit wildlife movements. You're creating open ground that species like box turtles or quail might like. And you're creating a flush of new growth of grass and flowering plants," he said.

Every Fire is Unique

Weeks, and sometimes even months, of planning go into the preparation for a single prescribed fire. A burn plan that outlines the goals for the burn and every aspect of what will take place on the burn unit is created. Finding a perfect day to burn—one with the right balance of wind and humidity—usually takes even more time. Too much humidity and the fire won't burn hot enough; too little humidity and it could burn too hot and fast. Having the right wind speed and direction is important, also; wind from the wrong direction could blow smoke towards nearby residents and cause problems.

Other details, like access for people and equipment with entry and exit routes, control lines, and even alerting local emergency services ahead of time, are all critical. Even having the right ratio of gas to diesel in the drip torches for the individual day's conditions matters. Finally, when all the conditions are perfect, there may be only be a short window of time to get everyone on the ground to conduct the burn.

"There are probably 40 hours of planning that go into it before you even strike the match," said Rebecca Wilson, longleaf pine restoration specialist with the Department of Conservation and Recreation (DCR), Division of Natural Heritage who frequently burns with DWR staff. And she says that first

match will be used to light a small "test fire," to confirm conditions are good before the larger burn can take place.

DWR Wildlife Area Manager Samantha Lopez enjoys the challenge of it all, especially writing a good burn plan. "I think it's an opportunity to be creative. As weird as it sounds, 'a fire is not fire, is not fire,'" she said. You can do what you think is the exact same type of fire, but a five-degree difference in humidity can have totally different effects. Different times of the year, or even just a slight difference of the fuel that you're burning, have an effect. You can't think, 'let's do the same blueprint and get a great burn every time.' Every burn is different."

DWR's fire crew are all adding prescribed fire to their day jobs. The fire crew includes staff that work as fisheries and wildlife biologists, Conservation Police Officers, Wildlife Area Managers, and more. Time digging lines and doing prep work such as dropping hazardous trees allows for plenty of bonding with coworkers from different regions. "You end up learning more about these people than you ever thought you would," Lopez said. "I learned that one of the other firefighters is teaching himself Japanese so that he can be a translator."

Conditions in the field at a prescribed fire can be brutal, and the terrain rugged and remote. "It takes a certain type of person to find this work challenging and interesting because it's definitely a dynamic habitat management tool," said Living. "It requires a lot of focus because it's hot or it's really cold, and it's really smoky. It's a really long day. We require a work capacity test. Our staff is required to do at minimum the moderate level, but we encourage them to qualify for the arduous level. That just ensures they have the conditioning to go through a really long, hard day of very physically demanding work in challenging conditions."

The Outdoors are Better Together

One way the DWR fire crew handles the immense workload of a prescribed fire is to partner with like-minded groups and agencies, all of which have certified staff members trained in safety and logistics. These strong partnerships include sharing of resources, equipment, knowledge, and personnel. Mobilizing more resources provides a bigger impact, allowing for bigger burns of more acreage.

Kline enjoys the teamwork aspect of a burn. "We get to work with and learn other things from other agencies," he said. "We work a lot with The Nature Conservancy, the Department of Conservation and Recreation Natural Heritage, the Department of Forestry, U.S. Fish and Wildlife, and the U.S. Forest Service. We're all working for conservation, and we all have different goals and objectives on those lands, but in the end, fire is a tool that we use in all these landscapes and it's just a great partnership."

After a prescribed burn, a meadow at the Goshen and Little Mountain WMA grows lush and green. Insets top down: Big Woods WMA also begins its renewal after a prescribed burn in both images.



Lynda Richardson/DWR



Robert B. Clontz



There's a conservation community spirit evident in the field on a prescribed burn. The connection between the various fire team members is one that goes beyond agency lines or public/private designations. No matter the patch a crew member wears, everyone is working together to safely burn a parcel of land in order to improve the habitat and make conditions better for wildlife. It's a camaraderie built on smoke and sweat.

Word is spreading about good fire, and the interest in using it on private lands is increasing as landowners are finding ways fire can help them meet a variety of habitat goals.

Landowners can enroll in the Virginia Department of Forestry's Certified Private Manager program, which provides training and information on the basics of prescribed fire application, as well as Virginia's laws and regulations pertaining to prescribed fire. They can become fully certified to burn on their own lands. Private landowners may be put off by the relatively complex fire operations that agencies execute with crowds of Nomex®-clad firefighters and specialized equipment. This level preparation and training may be necessary for managing large blocks of habitat in challenging terrain, but executing simpler burns at a small scale need not be so intimidating. With proper planning and an eye on the weather conditions, it's possible to burn safely with more modest resources. The Virginia Prescribed Fire Council is working to provide a variety of resources for landowners interested in fire: vafirecouncil.com.

After a long day on the burn unit, Lopez reflected on what the effects of prescribed fire mean to her. "The big thing is, 'How loud is the forest?' When you walk into a forest, it shouldn't be quiet," she said. "You should hear bugs, you should hear birds calling and woodpeckers pecking." Older mature forests can be important for a variety of wildlife, but many species on the list of Species of Greatest Conservation Need require something different, which is created with fire.

"When you go into a meadow or a really young, open forest, it's just so loud," Lopez said. "That's one of the greatest things—walking in and just having that classic soundtrack—birds and bugs and everything just being so loud and peaceful out in the middle of the woods, in the middle of nowhere." 🦋

Ron Messina is the Video Production Manager at the Virginia Department of Wildlife Resources.



For More on DWR's #GoodFire program:
Virginiawildlife.gov/good-fire

Marshall McDonald Left His Legacy in Virginia's Fisheries



The inventions and ideas of this 19th century fisheries commissioner made an impact that's still visible today.



By Donald J. Orth

Did you know that one item of equipment used in fish hatcheries all over the world has its roots in Virginia? The McDonald hatching jar, a plastic jar equipped with a tube in the center, creates a uniformly distributed flow of water to rotate fish eggs gently and evenly as they develop and hatch. Hatchery staff use McDonald hatching jars while growing a wide variety of fish species.

The McDonald jar system's history can be traced back more than 140 years, and the design was created by one of the first Virginia Fish Commissioners, Marshall McDonald.

The beginnings of conservation of Virginia fishes can be traced back to early efforts to reverse the rampant overharvest and protect fish from other human activities in Virginia. Major food fisheries were in such sad shape in 1871 that the Virginia General Assembly created the office of the Virginia Fish Commissioner. The new office would require an individual with a unique skill

set to lead fisheries efforts. The first individual to lead fish conservation efforts was McDonald, a man who possessed experience as an engineer, geologist, mineralogist, fisheries scientist, and fish culturist.

McDonald was only 40 years old when he was appointed to serve as Virginia's Fish Commissioner in 1875. He proved to be an effective leader who also developed numerous innovations, most importantly, patents for fishway design and a hatching jar, now referred to as the McDonald hatching jar.

Developing Virginia's Fish Culture Process

McDonald, who was born in Romney, Virginia (now West Virginia), was educated at the University of Virginia and the Virginia Military Institute. He came from a long line of military men and was a Colonel in the Confederate Army during the Civil War before he became a professor at Virginia Military Institute. While serving as professor there,

McDonald developed his interest in fish farming.

In his youth, McDonald's interest in fish was nurtured while studying the natural history of fishes at the Smithsonian Institution. Here he was supervised by Spencer Fullerton Baird, one of America's leading naturalists at the time. Baird trained many young naturalists and oversaw the construction of the U.S. National Museum (now the Smithsonian Arts and Industries Building). Before his death in 1887, Baird also served as the first U.S. Fish and Fisheries Commissioner. In this role, Baird worked to reverse the decline in many food fishes due to overharvest. McDonald's early association with Baird would lead to many new opportunities that benefitted fisheries in Virginia and elsewhere.

Raising and stocking fish was a major intervention that would be essential to the success of the fledgling Virginia Fish Commission. J.T. Wilkins, Jr., the second Commissioner, wrote that "the question of greatest importance to our

fishermen is the appalling decline in the number of the free migratory fishes that annually visit the waters of the State." At the time, fish culture methods were in their infancy and well-developed only for trout and carp.

McDonald's most enduring legacy from his time as Virginia's Fish Commissioner was the application of fish culture in Virginia, which led to his prominence later in his career. As Commissioner, McDonald initiated the construction and operation of the first three hatcheries in Virginia (in Lexington,

Blacksburg, and Wytheville). The hatchery at Wytheville was first operated by the U.S. Fish Commission and rapidly expanded to have 12 rearing ponds, nine spawning ponds, and buildings that held rearing troughs. This hatchery exists today and is privately owned and operated for fee fishing and trout culture.

McDonald also recognized the need to collaborate with other fisheries scientists and fish culturists at the time, working stints at Woods Hole, which later became Woods Hole Oceanographic Institution (Massachusetts). McDonald

spent a winter at the Woods Hole lab, where he developed a new apparatus for catching the eggs of cod, halibut, and other marine fishes with pelagic eggs and a cod-hatching box. He became a leader as a fish culture professor and served as President of the American Fish Culturist Association (now the American Fisheries Society).

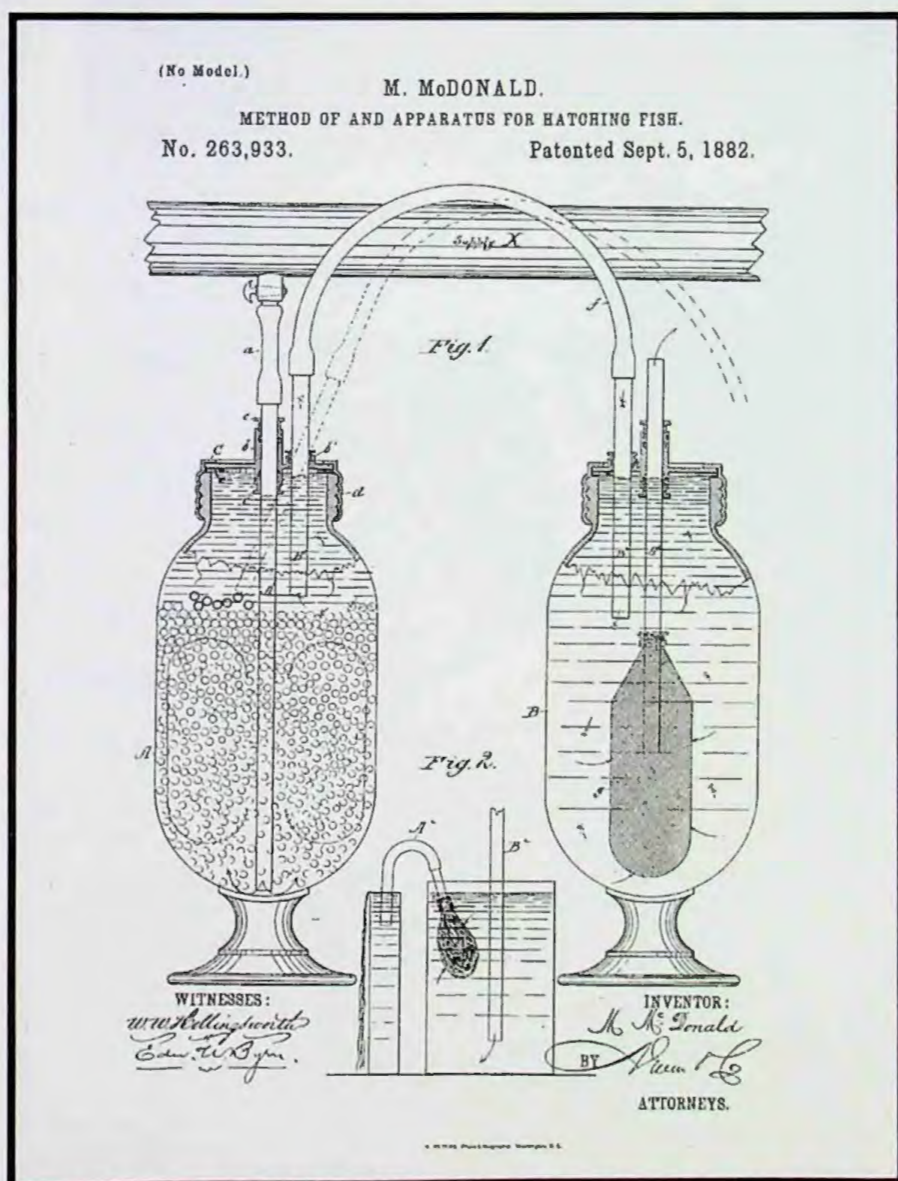
Remarkable Innovations

Hatchery production at the new Virginia hatcheries was limited by the slow, manual process of separating dead eggs from live ones in hatchery troughs. Especially in whitefish and shad, fungus rapidly develops among dead eggs, leading to the loss of many live eggs before hatching. Also the cumulative impacts of capture, handling, transport, and confinement on American shad often results in fatal progression of stress-related effects.

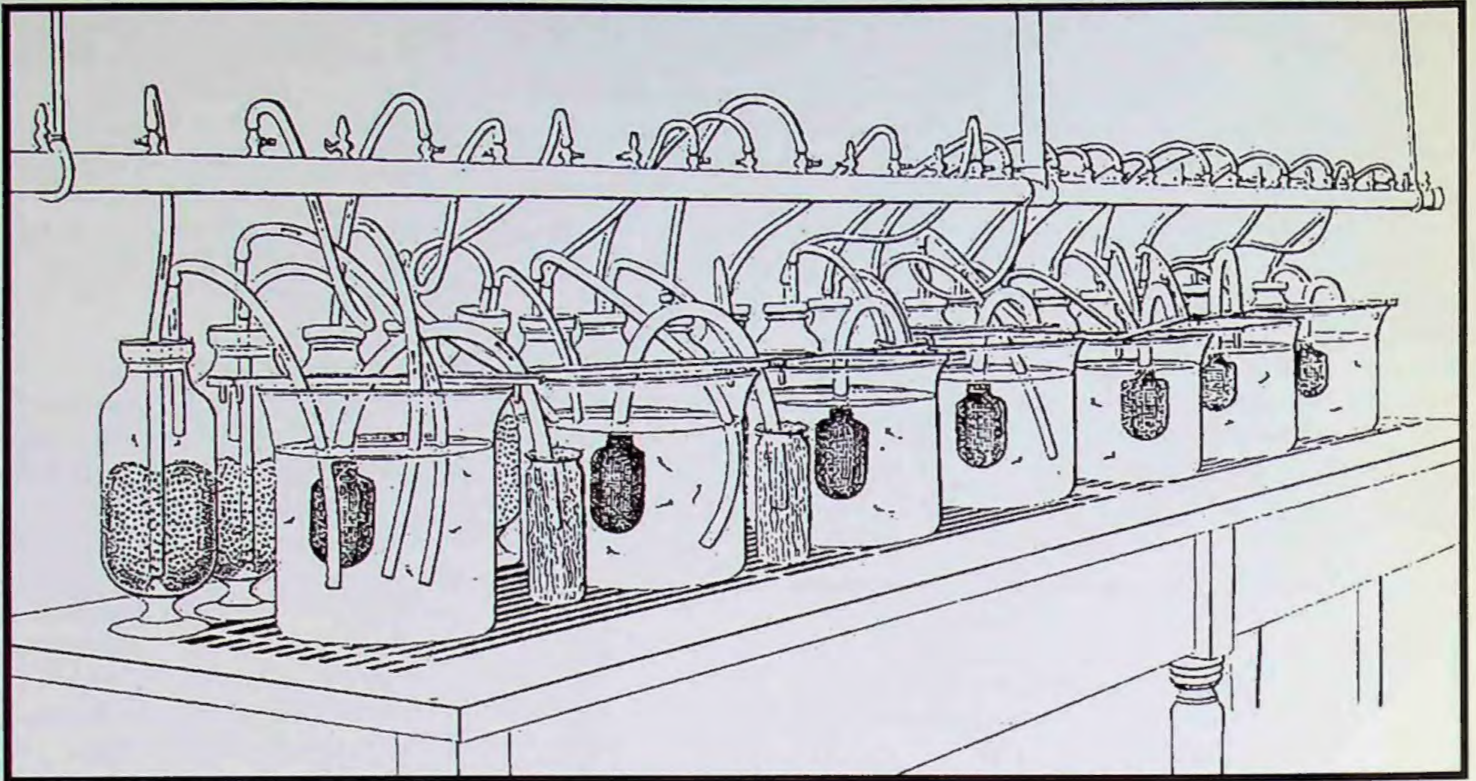
McDonald's new invention was labeled as an "automatic" hatching jar that would save on labor costs. His new hatching jar relied on the knowledge of a difference in specific gravity between living and dead eggs. The hatching jar had currents that moved eggs in circulation, causing dead eggs to remain at the surface where they would be removed via an exit tube.

The new hatching jar was exhibited before a meeting of the Biological Society at the Smithsonian Institution in 1881. McDonald's experiments with the device were decisive, and he recommended adoption of the method to the United States Fish Commission. McDonald also received a patent (U.S. No. 263,933) for the design in 1882. The McDonald-type hatching jar has since become the industry standard. His hatching jar invention made possible a major expansion in shad propagation.

Chinook salmon eggs from California were hatched in these hatcheries in 1876 and yielded salmon fry that were released in the tributaries of the James and Roanoke drainages. The Virginia Fish Commission reported in 1877 that hatcheries were "doing good work,"



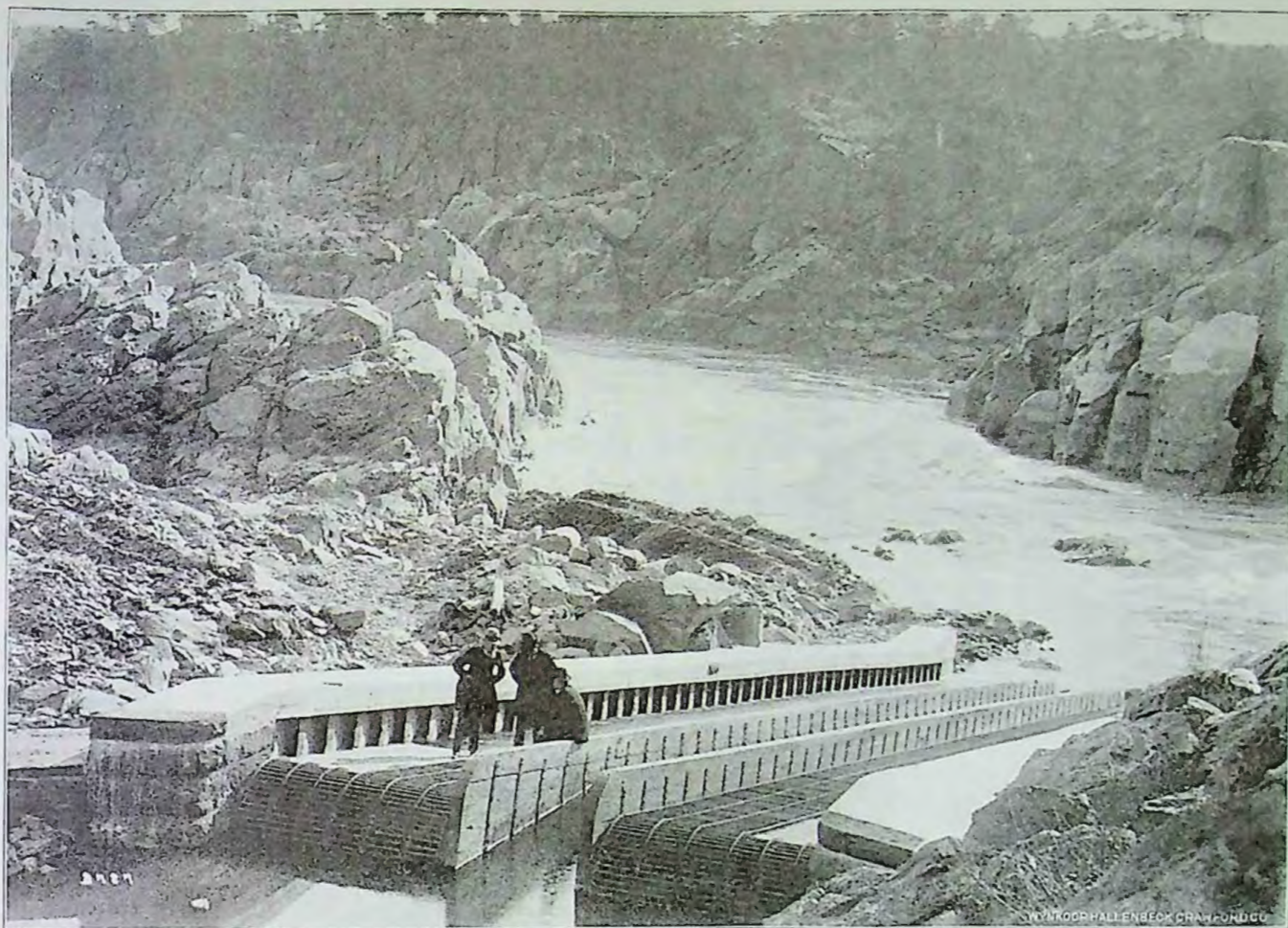
The 1882 patent drawing of the McDonald hatching jar shows that the left glass jar is for hatching the eggs and the right jar receives the fry.



Drawing of McDonald's hatching jars from his patent application.



McDonald hatching jars in use at the Virginia Department of Wildlife Resources (DWR) Vic Thomas Fish Hatchery.



ORIGINAL McDONALD FISHWAY WITH WATER SHUT OFF, IN GREAT FALLS OF THE POTOMAC.

The original McDonald fishway installed at the Great Falls of the Potomac was completed in 1892 at a cost of \$72,000.

although they were compelled to buy trout eggs because of bottlenecks in building a brood stock. However, the California salmon released never returned and efforts to propagate salmon in Virginia ceased.

From an early report (1887) on operations of the Wytheville hatchery, McDonald chronicles efforts to import rainbow trout from California, brook trout from Michigan, brown trout from New York, Atlantic salmon from Maine, common carp from Washington, D.C., and rock bass and smallmouth bass from Virginia waters. All these fish are established in Virginia waters with the exception of Atlantic salmon. Atlantic

salmon were stocked in a tributary of the Shenandoah River near Staunton and the South Fork of the Shenandoah River near Waynesboro. But returns were never realized.

Declines in migratory food fishes, including the American shad, America's founding fish, were of major concern at the time. Shad were harvested as an important food source by Native Americans, early colonists, and generations of Virginians. Commercial harvest peaked at the end of the 19th century, and pollution of tidal rivers and construction of mill dams blocked spring spawning migrations of American shad and other anadromous fishes. Although

American shad had been successfully strip-spawned since 1848, McDonald focused on efforts to improve hatchery production methods for shad, which adopted the McDonald hatching jar as the standard method for incubating eggs. Early shad culture was often conducted on ships or barges that could hatch and stock many Atlantic coastal rivers.

A Lasting Impact

McDonald also worked to provide pathways for shad to pass existing dams. He patented his first design for fishway construction. The McDonald fishway was installed on dams, including at Great Falls of the Potomac, to facilitate

the spawning migration of American shad. His patented fish ladder won a gold medal at the 1883 International Fisheries Exhibition in London.

New fisheries developed from McDonald's early stocking efforts. The stocking of smallmouth bass in the New River before 1883 can be traced to early efforts of McDonald. At the time, there was debate about introducing black bass (smallmouth, largemouth, or spotted bass) in trout waters. McDonald collected smallmouth bass from the Holston River to stock in the New River. Subsequently, summer resorts and campgrounds sprung up along the New River. McDonald reported that hotels and restaurants were paying \$5 per pound for black bass at the time.

McDonald's early successes in Virginia did not go unnoticed. In 1879, Baird recruited him for a position at the U.S. Commission of Fish and Fisheries where he served as a special agent, superintendent of the shad hatcheries, Chief of the Division of Fish Culture, and Chief Assistant Commissioner of the Fish Commission.

In 1888, McDonald was appointed the United States Fish Commissioner by President Grover Cleveland. The official announcement reported that "Cleveland has appointed a person of scientific and practical acquaintance with the fish and fisheries to be a Commissioner of Fish and Fisheries." McDonald made a lasting impact on fisheries surveys during his seven years with the U.S. Commission of Fish and Fisheries. He expanded the scope and thoroughness of biological and physical surveys in order to uncover the basic food supply for fish. McDonald led early research cruises of the U.S. Fish Commission's steamer, the *Albatross*, to investigate West Coast fisheries.

As Chairman of the General Committee on the World's Fisheries Congress in 1893, McDonald addressed the gathering with words that reflected his theory of fish propagation. "We should, I think, keep always in view that the object of public fish-culture is to assure the utmost utilization of the resources of our waters and to permit the largest production that can be accomplished without deterioration or impoverishment. We should insist upon whatever measures of protection or regulation may be found necessary to accomplish this end. On the other hand, we should be careful not to embarrass or harass the enterprises of our hardy and adventurous fishermen by restraints that are not clearly necessary to accomplish the end in view," read the text of McDonald's speech in the Bulletin of the U.S. Fish Commission.

President Cleveland was well aware of McDonald's expertise. At a reception at the White House, Cleveland quipped "I never see you, McDonald, without thinking of the fish." McDonald served as U.S. Fish Commissioner until his death in 1895 at age 59. Although McDonald's legacy is seldom acknowledged, he was responsible for many innovations that drove fisheries science forward, many of which are still in use today. 🐟

Donald J. Orth is the Thomas H. Jones Professor at Virginia Tech with special interests in studies of fish and fisheries in rivers. He is also a Fellow of the American Fisheries Society and an award-winning educator.



The McDonald hatching jar has made it possible for hatcheries to produce plenty of fish such as these trout for stocking our rivers and streams.

2021 Angler Hall of Fame



On the average, Virginia anglers measure more than 6,000 trophy-size freshwater fish annually. Their accomplishments are recognized by the Virginia Department of Wildlife Resources (DWR) through the Online Virginia Angler Recognition Program (OVARP). Anglers who register the largest trophy, by certified weight, of each species on the trophy fish chart each year are recognized as Angler of the Year. The Creel of the Year award recognizes the angler who accounts for the most trophy-sized fish caught and registered in OVARP from January 1 through December 31 annually.

Find out about the Online Virginia Angler Recognition Program (OVARP) at: virginiawildlife.gov/fishing/trophy-fish or call 804-367-1000

2021 CREEL AWARD goes to Alan Fred Harrington of Glade Spring.

- | | | | |
|----------------------|------------------------|------------------------|------------------------------|
| 1) Black Crappie - 1 | 4) Brown Trout - 8 | 7) Rainbow Trout - 22 | 10) Walleye - 3 |
| 2) Bluegill - 1 | 5) Common Carp - 1 | 8) Rock Bass - 1 | 11) White Crappie - 1 |
| 3) Brook Trout - 2 | 6) Largemouth Bass - 1 | 9) Smallmouth Bass - 1 | Total Trophy Fish: 42 |



2021 ANGLERS OF THE YEAR

SPECIES	SIZE	ANGLERS NAME	HOME	BODY OF WATER	DATE
Black Crappie	3 lb, 8 oz	Christopher Shields	Granite Falls, NC	Buggs Island Lake	4/20/2021
Blue Catfish	77 lb, 9 oz: 45.50"	Joseph Martin	Covington, VA	James River	6/23/2021
Bluegill	2 lb, 7 oz: 13"	Guy Dominique	Suffolk, VA	Western Branch Reservoir	5/20/2021
Bowfin	No Entry				
Brook Trout	4 lb, 15 oz	Charles Grant	Staunton, VA	Crooked Creek	6/3/2021
Brown Trout	8 lb, 8 oz	Okie Cahill	Pembroke, VA	Potts Creek	5/4/2021
Chain Pickerel	4 lbs, 11 oz	David Legg	Covington, VA	Jackson River	12/14/2021
Channel Catfish	14 lb, 2 oz: 30"	William Charles	Richmond, VA	Chickahominy Lake	2/28/2021
Common Carp	22 lb, 8 oz: 33"	Austin Turner	Narrows, VA	New River	3/27/2021
Fallfish	3 lb, 5 oz: 19.75"	Jerry Hall	Lexington, VA	Cowpasture River	3/21/2021
Flathead Catfish	37 lb, 0 oz	James Benedict	Manassas, VA	Occoquan Reservoir	4/18/2021
Freshwater Drum	21 lb, 4 oz	Matthew Overbey	Buffalo Junction, VA	Buggs Island Lake	7/7/2021
Hybrid Striped Bass	11 lb, 0 oz	John Casale	Mineral, VA	Lake Anna	3/16/2021
Largemouth Bass	11 lb, 2 oz: 27"	Christopher Ruffa	Midlothian, VA	Private Pond	3/12/2021
Longnose Gar	20 lb, 9 oz: 52"	Tracy Christopher	Carson, VA	Nottoway River	5/22/2021
Muskellunge	23 lb, 2 oz: 42"	John Harmon	Radford, VA	New River	5/3/2021
Northern Pike	6 lbs, 9 oz	Aaron Ball	Charlottesville, VA	Staunton River	10/9/2021
Other Sunfish	1 lb, 0 oz	Stephen Miklandrie	Chesterfield, VA	Private Pond	6/13/2021
Rainbow Trout	11 lb, 4 oz: 28"	Billy Bean	Pelham, NC	Smith River	1/9/2021
Redear Sunfish	2 lbs, 4 oz: 14"	Gerard Peterson	Chesapeake, VA	Lake Meade	11/30/2021
Rock Bass	1 lb, 1 oz	Christopher Barham	Capron, VA	Nottoway River	6/29/2021
Sauger	No Entry				
Saugeye	No Entry				
Smallmouth Bass	7 lb, 1 oz	Ethan Montgomery	Bristol, TN	South Holston Reservoir	4/28/2021
Striped Bass	23 lb, 2 oz: 39.25"	Timothy Reynolds	Chatham, VA	Smith Mountain Lake	7/14/2021
Walleye	8 lb, 4 oz: 28"	Justin Hylton	Bassett, VA	Philpott Lake	6/18/2021
White Bass	2 lb, 0 oz: 16.25"	Aaron Ball	Charlottesville, VA	Hycro River	4/10/2021
White Crappie	3 lb, 0 oz: 17.50"	Tammy Robertson	Penhook, VA	Private Pond	4/6/2021
White Perch	1 lb, 15 oz: 14.25"	Gerard Peterson	Chesapeake, VA	Lake Meade	12/30/2021
Yellow Perch	2 lb, 8 oz: 16"	Christopher Huffman	Clifton Forge, VA	Lake Moomaw	7/5/2021



EXPLORE, CHICKAHOMINY



The Virginia Department of Wildlife Resources maintains 46 Wildlife Management Areas (WMA) totaling more than 225,000 acres for a variety of outdoor recreational opportunities. To access a WMA, you'll need a DWR Restore the Wild membership or a Virginia hunting license, freshwater fishing license, boat registration, or access permit. For more information on WMAs: www.virginiawildlife.gov/wma.

Meghan Marchetti/DWR



ENJOY

WILDLIFE MANAGEMENT AREA

The Chickahominy WMA in Charles City County has a unique diversity of habitats: mixed hardwoods, pine forests, managed open fields, and wetlands for a total of 5,217 acres. Hunting opportunities include those for deer, turkeys, squirrels, rabbits, doves, and waterfowl. The Chickahominy River and Morris Creek offer excellent fishing for largemouth bass, crappie, striped bass, yellow perch, and catfish, including channel, blue, and white. Good opportunities exist for viewing many upland or wetland plant and animal species, including ospreys and bald eagles. Facilities include parking areas, a public boat ramp on Morris Creek, and a sighting-in gun range.

Explore the Wild with Primitive Camping on Wildlife Management Areas

By John Kirk/DWR

Photos by Meghan Marchetti/DWR

Primitive camping on a Virginia Department of Wildlife Resources (DWR) Wildlife Management Area (WMA) can be a fun and rewarding time to enjoy the peace and quiet of Mother Nature. We encourage you to take the time to unplug from the screen and explore the wild by taking the opportunity to fish, hunt, and view wildlife while enjoying the adventure of camping in one of the many scenic areas DWR has to offer.

To start your adventure, you will want to choose a WMA and make sure camping is on its list of allowable activities. You can do this at virginiawildlife.gov/wma/. To access a DWR WMA, you will need one of the following: a valid Virginia hunting, fishing, or trapping license; a valid Virginia boat registration; a daily access permit or a current Restore the Wild membership; in addition to a camping authorization, which is free. Licenses and the camping authorization, can be obtained from the Go Outdoors Virginia website or mobile app, or any DWR license agent. For more information about the camping authorization, please visit virginiawildlife.gov/camping-on-wmas/.

Primitive camping is temporary and remote. There are no established campsites and no amenities such as electric, potable water, dump stations, restrooms, trash cans, or convenience stations, etc. You will need be prepared to "Leave No Trace," including taking care of human waste appropriately and packing any supplies and garbage both in and out.

Primitive camping on DWR's WMAs can range from sleeping in a sleeping bag on the ground to those who prefer more creature comforts of a tent or even a small RV or travel trailer. Keep in mind that due to the size and





design of access roads and parking areas, not all WMAs may be suitable for RV or trailer traffic. Please check WMA rules found on the specific WMA's webpage and kiosk on site before you make plans to use these types of vehicles.

Mother Nature can be challenging, so have a plan, let someone know where you plan to be, dress for the terrain and conditions, bring extra layers, use bug spray, make sure you have appropriate navigational aids (maps, GPS, compass etc.), and remember there may not always be cell phone service. Depending on how long you plan to camp, make sure you have an appropriate amount of food and potable water. Don't forget the s'mores!

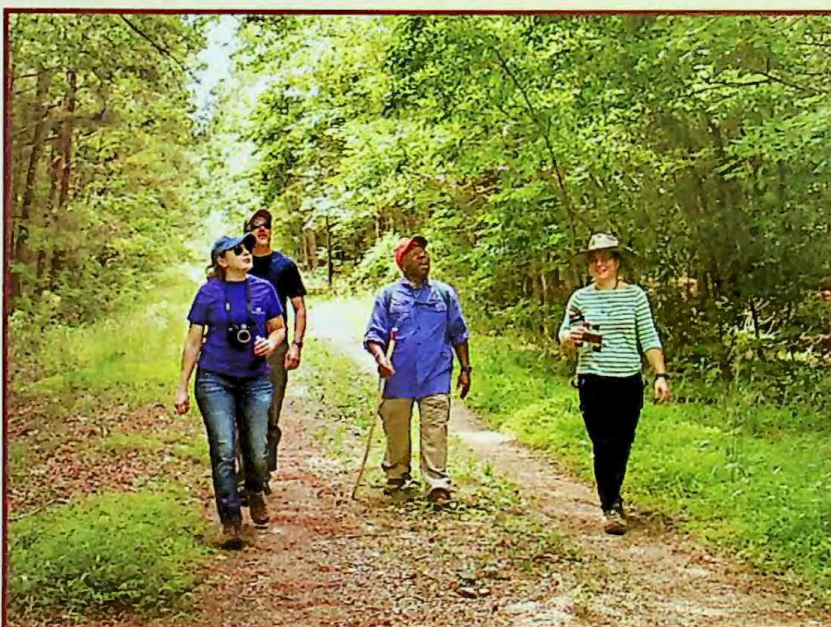
Make sure to take the necessary precautions to prevent food-related wildlife encounters. Keep yourself and wildlife safe by eliminating tempting smells as much as possible, and use wildlife-proof coolers or hang food between two trees at least 10 feet off the ground. If you are cooking or enjoying the comforts of a campfire in areas where they are allowed, please remember that they should not be left unattended. They should be completely extinguished when leaving, and from February 15 to April 30 they are only allowed between 4:00 p.m. and midnight.

You are allowed to camp on most of DWR's WMAs year round, including during hunting season. You may even camp on the WMA to allow for quick access to your favorite hunting spot. If you are camping on a WMA during hunting season, we recommend that you take note of your surroundings. If there are other vehicles in the parking areas, there may be hunters in the area. Put your campsite in a considerate spot, and consider putting an orange band around trees at your campsite to alert other users to your presence. Be sure to wear blaze orange or pink, and be on the lookout for other people as you move around the WMA.

DWR offers a wide variety of camping possibilities, from the Eastern Shore to the Blue Ridge Mountains on down to Southwest Virginia. With 46 management areas and more than 225,000 acres, there is a spot for everyone. Please remember, not every spot offers the same experience, so please be sure to access the DWR Wildlife management area page and stop and read the kiosk to be sure you are aware of any WMA-specific rules and details.

DWR hopes you come see one of our Wildlife Management Areas for your next camping adventure. Remember to relax, take the time to connect to nature, leave no trace, and we hope you enjoy exploring the wild! 🌲

Formerly the DWR Statewide Access Coordinator, John Kirk now serves as the Capital Programs Manager for DWR.



Awaken the Senses While Float Fishing



*Spending time floating down the river
can connect you to
the sights, sounds, and smells of
the natural world.*



By Gerald Almy
Photos by
Lynda Richardson/DWR

Dawn slips in softly where the Shenandoah River sweeps against the base of the Massanutten mountain range. By the time fingers of sunlight edge into the campsite, eggs are sizzling, coffee is brewing, and toast is browning in the iron skillet laced with sweet country butter.

The meal is a simple one, served on old tin plates and eaten with a tarnished fork as you perch on a gnarly, sun-bleached log. But somehow it tastes better than the fanciest Eggs Benedict and mimosas would in the finest restaurant.

That's a common feeling about the taste of a humble meal savored while camping along a river on a float fishing adventure, be it the Shenandoah, the James, or any flowage. All of the senses seem keener on the river, as if splashed awake with ice water. Your ability to perceive is renewed as the slow pace of the river allows you to soak in taste of the simple meal and the sights, sounds, smells, and textures around you.

The tone is set at daylight for the sequence of events that unfold throughout the trip at the perfect pace for assimilation. Float fishing is a tonic for sensibilities numbed by weeks of pent-up city and suburb life, a feast for the five senses.



After the tastes of the riverside breakfast, the visual treat is most clear. Your gaze dances from the distant tapestry of layered green mountains to dew sparkling silver on the grass, to saffron campfire flames licking the blackened coffee pot. You try to embed the scene in your memory so you won't lose it. A quick photograph helps. But no picture can ever capture the 360-degree experience unfolding around you.

Movement across the river catches your eye. A doe and her fawn edge nimbly to the shore. Below them, a mother wood duck and her fledglings splash in the shallows. A pileated woodpecker flits past in its jerky, rhythmic flight, then lands with a flutter of wings on a scraggly ash. Its red head stands out boldly in the morning light as it begins furiously

drilling and extracting a feast of insects from the decaying trunk.

The sense of smell is not neglected at the river campsite. The succulent smell of crackling bacon mixes with wood-smoke drifting on the frail mountain breeze. Black coffee sends its perky aroma steaming from tin mugs. The sweet bouquets of pine and fir and wildflowers mingle with the fragrance of clear river water.

The ears enjoy their own feast. Songbirds carol in shoreline boughs. In the distance, the throaty gobble of a tom turkey resonates across the mountainside. From a limb in a nearby tree, a gray squirrel scolds the strangers ensconced beneath his favorite hickory tree.

But you don't feel like an intruder in this riverside world, in spite of the

chattering squirrel's opinion. The feeling of at-homeness here runs deep. It's the same feeling you have when perched on a tree-stand high on a ridge as daylight breaks around you at the start of deer season, crouched in a frigid duck blind far back in the saltwater marsh, or camped on the edge of a trout-filled lake. In the city or the suburbs, surrounded by people, you can feel so totally alone and unconnected. Here along the river, you feel rooted and at home, a part of the natural world, if but for a brief, fleeting day.

Katydid chatter. Cicadas buzz. In the distance, a crow caws. Then suddenly, reminding you why you are there, a smallmouth bass launches itself from the water in a deft predatory lunge, nabbing a damselfly that flutters too close to the



surface, then falls back into the flow with a raucous splash. Barely have the ripples settled when another fish swirls on a shallow gravel bar, chasing a school of shiners.

These sounds are the sweetest of all—sweeter than the birds singing, insects buzzing, squirrels barking. The sounds of feeding gamefish are the siren beckoning, the purpose that has brought you here, allowing you to experience the many side bonuses that come on a float trip.

Break camp quickly. Load the boat. With a crisp stroke of the paddle you are off, drifting through gurgling ripples into a placid, deep green pool.

The small plastic tacklebox holds a dozen or so lures that you have confidence in—grubs, spinnerbaits, jigs, topwater plugs, small crankbaits. But as so many times before, you settle on your favorite river-bass offering—a small floating silver-and-black Rapala.

Knot it to the line, load the thin graphite rod with an arching backcast, then snap the thin plug towards a white rock outcropping in mid-stream. The lure lands with a tiny, satisfying splat. Pause to let the ripples bulge out and disappear into the river's surface. Then twitch the balsa lure sharply. Let the tiny waves dissipate. Twitch it again.

With a flash of bronze, the stabbing

take is there. You feel it in your muscles, deep in your bones—the tactile delight of a bass throbbing against the limber rod. The fish plunges, stripping line from the drag in staccato shrieks, changes course suddenly, then vaults skyward, spraying droplets that sparkle like diamonds in the morning sunlight.

The circle of the senses is complete.

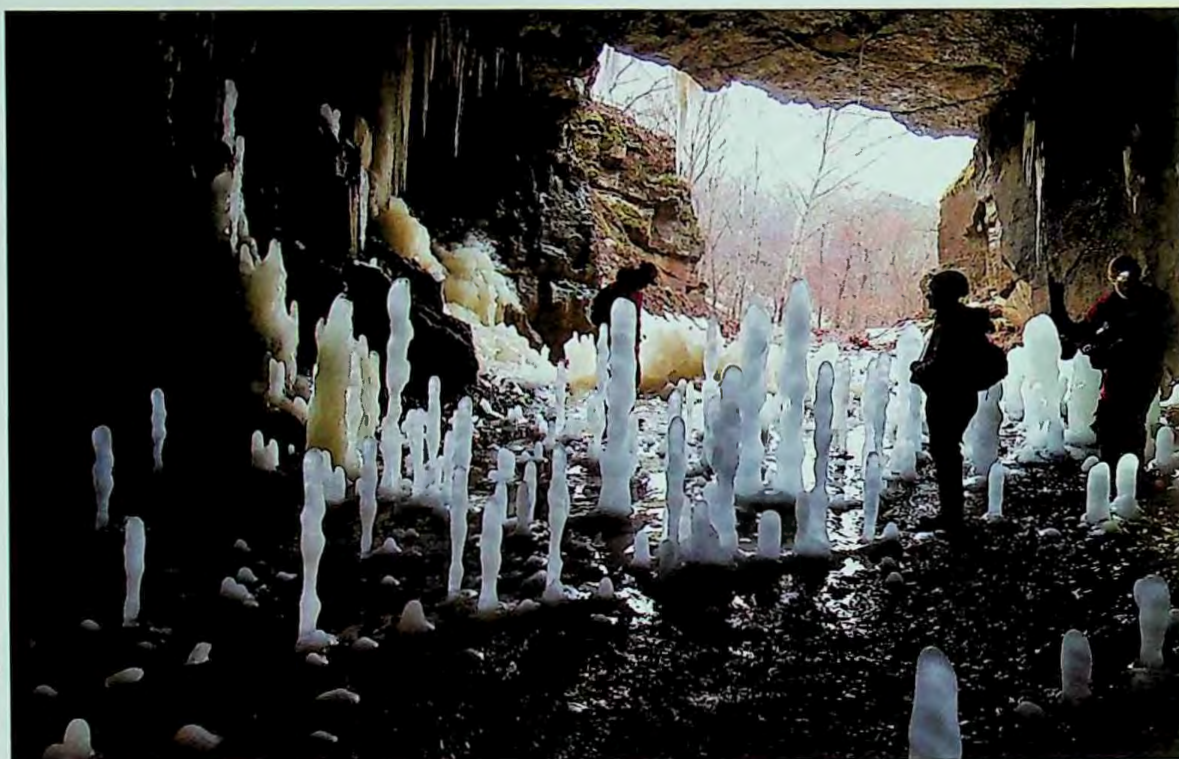
Gerald Almy lives in the Shenandoah Valley but travels widely for his work as a full-time outdoor writer. Among his many accomplishments, he is currently a columnist for Sports Afield and contributing editor for Field & Stream.

Working for Wildlife

By Molly Kirk

The mission statement of the Department of Wildlife Resources (DWR) reads that we seek to conserve, connect, and protect: Conserve and manage wildlife populations and habitat for the benefit of present and future generations. Connect people to Virginia's outdoors through boating, education, fishing, hunting, trapping, wildlife viewing, and other wildlife-related activities. Protect people and property by promoting safe outdoor experiences and managing human-wildlife conflicts. Here are a few of the many accomplishments of DWR staff in working toward those goals...

.....



Right: Conditions at the entrance of one of the hibernacula. Below: A cluster of Indiana bats.

Rick Reynolds/DWR



Rick Reynolds/DWR

Winter Hibernacula Counts

DWR's Region 4 non-game biologist worked in collaboration with the Virginia Department of Conservation and Recreation (DCR), Division of Natural Heritage and Radford University staffs to conduct bat hibernacula counts at a number of sites in western Virginia. These efforts started in early January and ran through February. These counts are conducted every other year to assess population trends of hibernating bats.

This work is critical to understanding the declines of certain bat species in the state, especially considering the spread of the deadly white-nose syndrome since 2006. Initial efforts indicate that of the three species highly impacted by white-nose syndrome, the tri-colored bat appears to be stabilizing, while little brown and Indiana bats appear to continue to decline.



J.D. Longest (left) of Quail Forever and Randy Kyner of DWR during habitat work at the Robert W. Duncan WMA.

Bobwhite Quail Habitat Work

Volunteers from the Central Virginia Chapter of Quail Forever joined DWR Lands & Access staff at the Robert W. Duncan WMA in the spring to complete habitat management work. They did site preparation for a prescribed burn and herbicide application targeting *sericea lespedeza*, an invasive plant. The work was with the goal to return the area to early successional habitat and promote growth of native vegetation.

"The Central Virginia Chapter of Quail Forever is thrilled about this opportunity to work alongside DWR to improve habitat at the Robert W. Duncan WMA," said J.D. Longest of the Central Virginia Chapter of Quail Forever. "The aim of this project is to help improve habitat for bobwhite quail, which should be a benefit to other game species such as deer, turkey, rabbits, as well as non-game species like song birds and pollinators."



One of the many boating access sites maintained by DWR staff.

Boating Access Sites Maintained

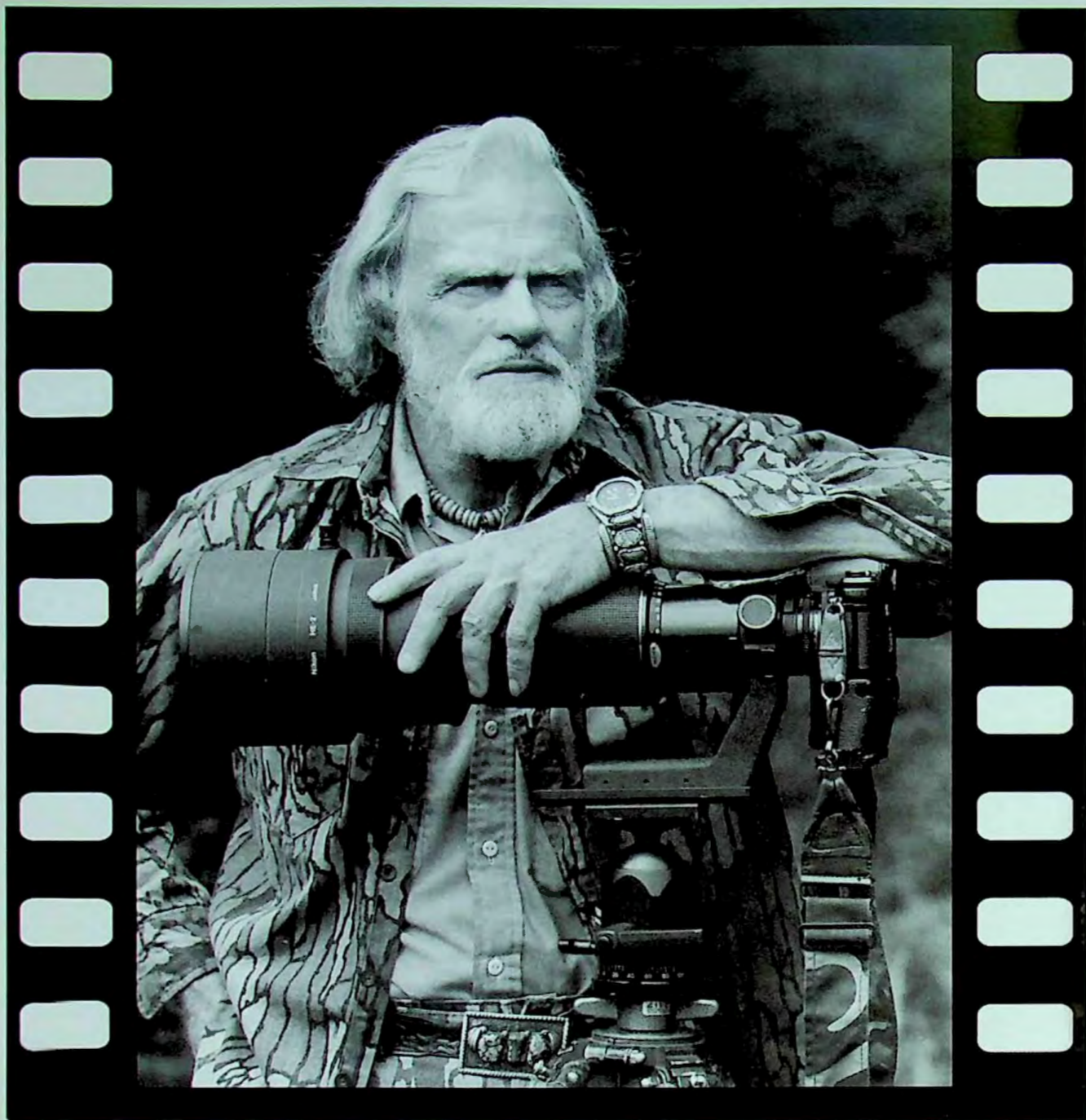
Across Virginia, DWR's four regional boating access maintenance managers work to keep the more than 200 boating access sites in good repair and available for the state's boaters.

Winter Tree ID at a WMA

In January, a Region 4 Wildlife Management Area (WMA) manager hosted a Winter Tree Identification Hike on the Oakley Forest WMA. The event was open to the public and organized by the Friends of the Rappahannock (FOR). The 13 attendees learned how bark, buds, and tree shape are used to determine tree species during the winter-time. A key topic discussed was the way forest management activities such as timber harvests, thinning, prescribed burning, and mulching are used to enhance wildlife habitat on the WMAs. Forest management projects help to increase the habitat value and forest cover type diversity on the DWR's properties, which benefits a wide array of game and non-game wildlife species.



The group gathered for the Winter Tree Identification Hike at Oakley Forest WMA.



Leonard Lee Rue III

Captures Wildlife Like No Other

The legendary wildlife photographer, videographer, and author has lived a fascinating life and made an impact on the world of wildlife conservation. by Mike Roberts



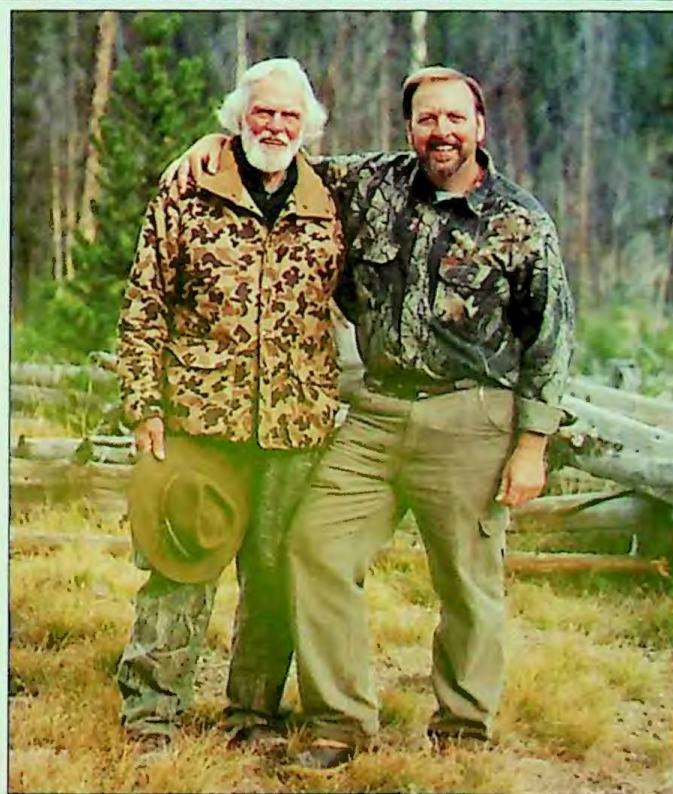
Above: Leonard Lee Rue has had thousands of images published, including these magazine covers. Right: The author, Mike Roberts (right), with his mentor Leonard Lee Rue III.

one day in the woods with a man bigger than life eventually came true.

Some of my fondest memories are of the times we spent together, whether sitting on his New Jersey patio feeding chipmunks or running from rut-crazed bull elk in Yellowstone's Gibbon Meadows. My most prized possession is a knife he gifted to me in the spring of 2012—the Randall he carried while photographing the seven continents. His only request was that I use the knife, rather than storing it in a display case. That wish was honored the following November when I field-dressed a 200-inch mule deer buck in Eastern Montana.

Speaking as his “adopted son,” and for the host of admirers across Virginia and America, thank you from the heart, Leonard Rue, for all you have given us! 🌿

A lifelong naturalist and wildlife photographer, Mike Roberts enjoys sharing his knowledge with others. You can contact him at: return2nature@aol.com.



The Spawning Behavior of Smallmouth Bass

By Bob Michelson
Photos by Photography by Michelson, Inc.



An adult male smallmouth bass cruising the shallows for food during the fall. The fish is hunting for small fish and crayfish after not eating for several weeks while caring for a brood of youngsters.

In early spring, usually from April through early June in Virginia, the male smallmouth bass ventures into shallow, rocky coves and shorelines. Here, the shallow water has begun to warm under the bright spring sunshine. The water temperature at this time is usually around 60° Fahrenheit.

Smallmouth bass in Virginia are native to the Tennessee and Big Sandy rivers drainage streams of southwest Virginia. The species has been introduced into all the major fast-flowing rivers and cool lakes of the Commonwealth.

Smallmouth are attracted to clear, flowing streams and rivers with bedrock, rock, and gravel bottoms, and numerous riffles. They also like cool, deep water in large, clear reservoirs with both boulders and gravel bottoms. Most activity takes place once waters have warmed to between 67° to 72°.

The Virginia state record smallmouth bass is 8 lb. 1 oz., and was caught in the New River by Donald S. Eaton on March 3, 2003.

Male smallmouth bass seek an area on the bottom that has just the right

mix of clean sand and cobblestones. Typically, this area will have a large rock, sunken tree, or ledge nearby. Waters where nest sites are selected are usually between 2 to 4 feet in depth.

The bass satisfied with the area will begin to sweep away coarse materials, silt, and debris with its caudal (tail) fin. The end result will be a circular depression 2 or 3 feet in diameter and 2 to 4 inches deep. This process may be repeated several times in other locations before the male is satisfied with his handiwork.

As Virginia's waters warm, this popular sport fish begins to reproduce.



While spawning occurs, the male (bottom) and female (top) will assume pair formation several times during the spawning cycle. They will align themselves parallel to one another over the nest bottom. This along with push-lead, head-down, and cross-over behaviors are repeated many times until the spawning process has been concluded and the female is chased away from the eggs by the male.

As the water continues to warm between 60° and 78°, female smallmouth bass approach spawning areas from deeper water. As the females approach this area, their coloration is transformed into a series of dark vertical markings called bars. When a male sees a female, he rushes toward her and attempts to drive her to the nest site. At first, the female swims rapidly away, only to return later.

During his attempts to drive the female to the nest, the male employs several behavioral tactics. In response

to the approaching male, the female will orient herself in a head-down position in the water column. Circling movements by the male around the female are accompanied by contact nips from the male directed to the body of the female.

Near the nest site, the male and female circle the nest in the typical push-lead behavior. These processes are repeated several times before the female swims to the nest accompanied by the male. The male and female descend to the nest substrate and engage in a number of behaviors such as crossover,

where the female crosses her tail section over the male, and pair formation, where the male and female bass align themselves in parallel positions head to head and tail to tail over the nest bottom.

Circling in the nest is often accomplished with the male outside the female working their way around the nest. Finally, the female rolls laterally over the nest and deposits eggs into the nest, followed by the male releasing milt to fertilize the eggs. As the female ceases pair formation with the male, she is chased away from the nest site.



Male guardian smallmouth bass stands watch over newly deposited eggs in a typical 2- to 3- foot diameter sand crater nest. Before spawning, the male uses his caudal fin, or tail fin, to clear out a depression on the lake or pond bottom, usually near a large rock or submerged tree branch.

Now comes the time for the male to either attract more females to the nest for spawning, or to begin his guard status over the newly fertilized eggs. These eggs are pale gray and yellow and are very sticky. They adhere to each other and any other debris such as stones in the bottom of the nest. Incubation takes about 10 days.

The male is so protective of his brood that he will often attack onlookers that venture too close for comfort, regardless of their size. The male will not feed again until the young bass leave the nest site

several weeks later. He will strike at any object that settles into the nest area, such as a lure, but only in defense of his young. He also removes foreign matter quickly to areas beyond the nest site.

Newly hatched fry are approximately $\frac{1}{5}$ of an inch in length and are nearly transparent. They live in the nest bottom as they gradually absorb their yolk sac. As the yolk sac disappears, the young fry begin to feed and at this time turn jet black in color. From this stage, the term black bass was created. Black fry rise over the nest in a dense swarm and



Above: Newly fertilized smallmouth bass eggs in a cobble bottom nest. The eggs that are white have failed and will not become young fish. The small bubbles are actually deposits of oil naturally found in newly fertilized bass eggs.



Male guardian smallmouth bass surrounded by hundreds of black fry. These newly hatched bass are about a quarter of an inch in length and jet-black in color. After swarming and feeding in the immediate area of the nest under the watchful eye of the male for about two weeks, they will start to turn green and disperse to other areas to feed and grow.



Above: A juvenile smallmouth bass in November. This fish was hatched six months before this photo was taken, sometime between mid-April to early June.

continue to feed under the watchful eye of the guardian male.

As the size of the fry increases, the black fry slowly transform into the green fry stage, the coloration of a typical smallmouth bass. At this point, the green fry disperse into shallow rocky areas that afford protection and food in order to continue in their development. The fry will continue to grow until the mature spawning age of approximately 2 to 3 years.

Once the fry have dispersed, the male bass will leave the nest site and

begin a period of recovery because he has not fed since spawning several weeks earlier. At this point, he will return to his home range area and feed on crayfish, minnows, and other available food items. 🐟

Robert Michelson has been a professional photographer/videographer for more than 45 years. A certified scuba diver, he specializes in underwater photos and video. His photography and articles have appeared in national publications such as Natural History, Field & Stream, and National Geographic.

1 ON THE WATER 2

By John Page Williams

Flatwater Paddling Skills for Canoes



Shutterstock/sianc

Like pickup trucks, open canoes have many uses. From the wild rice marshes of Virginia's many tidal fresh creeks to our salt marsh lagoons, they're great vessels for exploring the wild. There are tricks, though, that make those adventures easier, safer, and more fun.

The main safety consideration is to wear a life jacket that fits whenever you're on the water. Be aware of weather conditions and water temperatures, and dress appropriately. Follow boating rules, and respect property owners and other paddlers. And it's always wise to leave a detailed paddle plan with a friend on shore.

If you're new to paddling, first learn the basic strokes: bow, reverse, J-stroke, sweep, pry, draw, and cross-draw. They're all about efficient use of muscles.

Tandem paddling (with a partner): It's satisfying to paddle well with a partner. "The swing" is a state in which everyone is synchronized and can feel the boat accelerate. The swing comes easily in a canoe when two paddlers synchronize. The bow person sets a steady rate, and the person in the stern follows it, while also constantly correcting the boat's course as needed with a J-stroke. Learning the swing is well worth the time invested. It's a great feeling, and it helps the canoe cover miles with minimal effort.

Maneuvers: Canoes are great vessels for exploring winding tidal creeks, where the strokes that move part of the canoe sideways come into play. When tandem paddlers learn to use combinations of the sweep, pry, draw, and cross-draw strokes, they'll have great fun pivoting in smooth, quick, sharp turns going up winding channels.

Stern vs. Bow: When two paddlers are of different sizes or strengths, the standard configuration is for the stronger to

paddle stern, using a J-stroke to keep the boat on course. If the crew change position, the stronger bow stroke will tend to turn the boat away from the side that person is paddling on, and the stern J-stroke will reinforce, not correct that turn. The solution is simple, having the stern person counteract that turning force with a K-stroke. Here, he/she begins each stroke by first reaching forward and to the side, essentially beginning each stroke with a little bit of a draw.

Adjusting to Wind or Current: On flatwater, wind is a constant. Unless you're paddling directly into or with it, it will tend to push the windward end of the canoe sideways. There are ways to use that force to advantage. For example, if the wind is on the port (left) bow, having the stern paddler paddle on the starboard (right) side will counteract it, reducing the effort of J-strokes. In time, you'll develop a feel for working with, instead of against, this wind effect, and you'll find your stern strokes become hybrids of the standard configurations, depending on what adjustment the canoe needs to stay on course.

Paddling solo with a double-blade: If a canoe is like a pickup truck, and you're paddling solo, using a double-bladed paddle is like dropping a diesel under the hood. Try it on land first. Pick up a long double-blade and take a stroke as you would by rotating your upper body as you push forward with your upper hand while using your lower hand as a fulcrum. Repeat on the other side. Now place a pad just forward of stern thwart of your boat, launch, board, and kneel on the pad, resting your tail on the thwart. Just start paddling. It's a great way to travel on the water. Not only will you be able to keep up with tandem crews, but you'll have more control in headwinds with a single paddle.

In more than 40 years at the Chesapeake Bay Foundation, Virginia native John Page Williams championed the Bay's causes and educated countless people about its history and biology.

Resources for Learning Basic Canoe Paddling

- The American Canoe Association has lots of information and videos on paddling basics and techniques: americancanoe.org
- Paddling.com has articles and videos on strokes, safety, gear, and more as well as a search feature for instructors: paddling.com/learn
- Paddling at State Parks: dcr.virginia.gov/state-parks/paddling



A Walk in the Woods

Column and photo
by Mike Roberts

Reminiscing about the Butcher Bird

Planet Earth has been an orb of change since the dawn of time, as was evidenced by the shellfish fossils I once chipped out of soft, red rock atop a lofty mountain ridge in Southwestern Virginia. Of all the factors associated with the Big Blue Marble's alarming degradation, there is no denying the rapidly increasing human population as being one of the most influential. In 1950, the year I was born, the human population was estimated to be 2.5 billion. That number has now tripled!

Although it is not the only environmental concern, producing food enough to nourish 7.9 billion people—plus the associated land-use practices—along with the growth in residential development to house people have resulted in the loss of an unbelievable amount of critical wildlife habitat. While some might consider human progress more important than wildlife, it is imperative we remain ever mindful that these creatures are a living barometer for the wellbeing of the natural resources that sustain all life forms. Case in point, avian numbers in North America have waned nearly 30 percent over the past 50 years, which equates to a estimated loss of nearly 3 billion wild birds!

One species in drastic decline is a unique passerine that once inhabited much of Virginia—the loggerhead shrike. As a youngster hiking the hills of our small Bedford County farm, I frequently observed shrikes flying along the brushy hedgerows that separated the cow pastures from the hayfields. That farm provided every element required by those habitat specialists: grazed pastureland; fence posts and abundant dead snags from which to hunt; and hedges of red cedar, hawthorn, and chick-asaw plum for nesting and storing prey. And I knew well the shrike's dipping flight and chattering, fussy calls.

Searching for grasshoppers, beetles, and skinks kabobbed on needle-sharp spikes of thorn-apple and wild plum shrubs, and on the rusty barbs of our wire fences was one of my regular outdoor adventures. The sight of a chipping sparrow impaled on a four-inch thorn remains as vivid in my mind today as it was the June morning I discovered its lifeless body

some 60 years ago. Initially, I suspected the sparrow's death to be the result of reckless flight, but upon closer investigation, it became obvious the little bird had been skillfully skewered by the notched, raptorial bill of a shrike. The worn pages of a reference book authored by T. Gilbert Pearson backed up my field observations.

While I was keenly aware that loggerhead's cached food in preparation for times when prey was scarce, years passed before ornithologists discovered additional purposes of their larders. We now know shrikes sometime leave certain species of insects and reptiles suspended in place for weeks to allow for the breakdown of protective toxins. In addition, we have

learned males often decorate barbed-wire fences and thorny shrubs with their victims as proof of hunting skills to potential mates.

From a historical standpoint, the arrival of agricultural-minded Europeans likely resulted in an increase in loggerhead shrike populations throughout much of eastern North America. The transformation of vast forests into croplands and pastures produced an expanse of open habitat perfectly suited for the

fierce, feathered predators. Further along on America's timeline, and aided by the Industrial Revolution, farming methods gradually improved to meet growing demands. Eventually, most hedgerows were cleared away and pesticides were applied in bulk. During the early 1970s, through a combination of reduced food sources and loss of nesting habitat, shrike numbers plummeted. Unfortunately, that decline continues.

The opportunity to observe these pint-sized raptorial songbirds in the Commonwealth of Virginia is rarer than it was when I was young, but thanks to another bird, their vocalizations can still be heard. Whenever you go for that walk during springtime, tune in to the Northern mockingbird's repertoire of tunes and listen for its subtle imitation of the loggerhead shrike.



A lifelong naturalist and wildlife photographer, Mike Roberts enjoys sharing his knowledge with others. You can contact him at: return2nature@aol.com.

PHOTO TIPS

Column and photos
by Lynda Richardson



A Mentor Can Help You Pursue Your Passion

As I read Mike Roberts' story about Leonard Lee Rue III (p. 30), it brought back memories of my first discovery of Lennie's work when I was just starting out as a wildlife photographer myself. Back in the film days, Lennie was definitely the most prolific and published wildlife photographer around. His work set the stage for other budding wildlife photographers hoping to follow that same passion. Lennie was definitely a photographer, videographer, and author like no other.

Mike mentioned that Lennie has been a mentor to him—what a great person to have as a mentor! Lennie is full of knowledge about wildlife and has published many books to prove it. In addition to marketing his images and videos, Lennie also created useful products such as camouflaged blinds, window mounts for long lenses, and educational videos. (I have two of his blinds, one window mount, and a bunch of his books!)

I truly believe that having a photography mentor can help accelerate someone's journey toward fulfilling their passion. Mentors can help with technical skills such as camera functions and lighting as well as how to photograph various species. Their guidance can extend to putting together an outstanding portfolio and suggesting strategies in running a successful business, thus helping to eliminate some of the harsh learning curves that every newbie professional photographer would normally struggle through. And a mentor is someone with whom you can share your rejections and bad experiences as well as the joys and successes. They will totally understand because they have been there.

When I first decided that I wanted to be a professional photographer, I wasn't sure of what type of photography I wanted to pursue, so I was open to it all. I first worked in news and marketing but along the way I worked as an assistant for many photographers specializing in corporate, advertising, fashion, product, and editorial photography. I learned so much from all of those talented mentors and am still grateful to this day for their guidance. My final career choice, wildlife and environmental photography, took off thanks to hard work and what I learned along the way.

So, how does one find a mentor? Joining a camera club is one way to begin. In a camera club you can find like-minded folks who share a passion for your specialty. Many camera clubs offer outings where you can shoot, watch others work,

and ask questions. Camera clubs will sometimes offer critiques or competitions that you can take part in. Do an internet search for camera clubs near you and attend a meeting to see if you like the club. Maybe you will find a willing mentor there.

One organization that I really love and admire is the North America Nature Photography Association (NANPA), nanpa.org. Membership in this organization provides access to more information and experience than you could ever imagine in one place. NANPA members are great folks and some of the most talented wildlife photographers in the world. This is an organization where you could find a mentor through the many activities offered.

Lastly, another way to find a mentor is to research photographers specializing in your type of photography and see whose work you love. Many professional photographers offer workshops, private lessons, and/or portfolio reviews. You will probably have to pay for these offerings, but it is also a great way to meet a potential mentor. Some professional photographers even offer internships, which is a great way to get a foot in the door.

If you would really like to succeed as a photographer, or even just improve your skills, a mentor can be not only a great teacher, but also a lifelong friend.

Lynda Richardson is the art director of this magazine.

HERE'S YOUR CHANCE TO FIND A MENTOR!



NATURE
PHOTOGRAPHY
SUMMIT
May 5-7, 2023
Tucson, AZ

Become a member of the North American Nature Photography Association (NANPA) and you will have access to hundreds of nature photographers from all over the world!

For more information on NANPA, go to: www.nanpa.org/



Citrus Soy Marinated Snakehead

Serves two

Marinate: Overnight

Cook Time: 4-6 minutes

Marinade: Enough for ~2 portions of snakehead filets

Juice of ½ a lemon

Juice of ½ a lime

1 tbsp soy sauce

2 tbsp extra virgin olive oil

1 clove garlic, minced

¼ tsp smoked paprika

¼ tsp oregano

Method:

Combine all marinade ingredients and mix well. Combine filets and marinade in a nonreactive container and cover.

Refrigerate overnight.

Cook over high heat on the grill, or sear in a pan for about 1 minute per side. Once you get a little browning on the outside of the filet, move to indirect heat or preheated (350°-375°F) oven for 4 to 6 minutes until the internal temperature of the filet reaches 130°F.

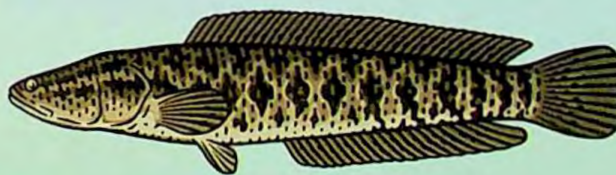
Remove from grill or pan and serve hot.

On the hottest days of the summer, there's a good chance that you'll find me standing on the stern of my little, leaky, old jon boat, cruising the shallows of tidal creeks looking for snakeheads. I can wax poetic about their raw power, fierce fighting, and fickleness, but those aren't the reason I spend hundreds of hours a year looking for a fin out of the water, a shadow under a lotus, or the raindrop pattern of their fry.

I obsessively chase these fish because they are my favorite freshwater fish to eat. Clean-tasting and firm in texture, snakeheads taste more like mahi than any other fish you can pull out of a tidal creek in the summertime. Their texture allows for high-heat cooking methods like grilling, without fear of the filets breaking apart. Grilled snakehead filets are on the weekly menu if I am so fortunate during the summer. Their mild taste makes them prime candidates for marinades and robust sauces.

This marinade is pretty simple: a little bit of citrus, soy, garlic, smoked paprika, and oregano. After marinating overnight, cook on the range or on the grill. I usually pair this with rice and some sauteed greens. Cook the greens with some of the extra marinade; it gives them a little savory tanginess that is perfect for a warm-weather meal.

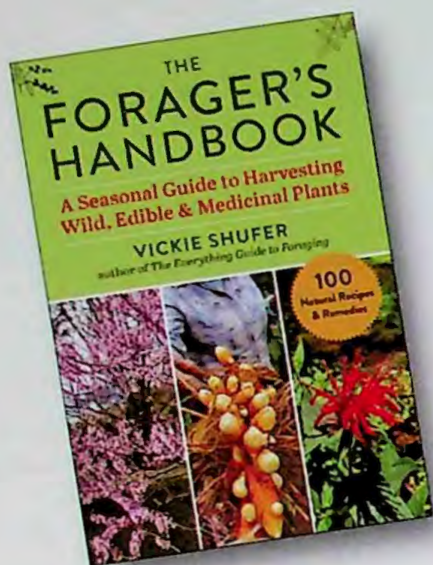
Wade Truong is a lifelong Virginian and self-taught chef and hunter whose work has been featured in *The New York Times* and *Garden & Gun*. To learn more about Wade and his company, *Elevated Wild*, check out: elevatedwild.com



Northern snakehead are an invasive species in Virginia's waters. If an angler wishes to keep a legally caught Northern snakehead, the fish must be killed to be in possession, and the angler must call the hotline at 804-367-2925 or other DWR contact, or submit an online report, providing the angler's last name and date, location, and size of catch. There are no size or bag limits on Northern snakehead, and DWR strongly encourages harvest of this species to control abundance. Find out more at: virginiawildlife.gov/fishing/snakehead/

GOOD READS

by Beth Hester



The Forager's Handbook: A Seasonal Approach to Harvesting Wild, Edible & Medicinal Plants

by Vickie Shufer

2022 Skyhorse Publishing

Color photos, b/w illustrations, recipes
skyhorsepublishing.com

"This book is the culmination of all that I've learned and shows you how to live the way of the forager throughout the year. When the earth provides, the benefits are many." –The author

Vickie Shufer grew up on a tobacco farm in rural Kentucky. While living conditions were what she describes as "extremely primitive," she relished spending time outdoors exploring her surroundings, often accompanied on such rambles by a favorite book. Native foods were a huge part of her childhood experience, and she delighted in discovering walnuts, persimmons, apples, wild grapes, berries, and all kinds of widely available seasonal foods just ready for the picking. An appreciation for nature's wild abundance and a desire to share her knowledge of wild and medicinal foods have always been her North Star.

This engaging handbook focuses on foraging as a lifestyle. It's the culmination of decades of work, both in academia and in the field. Shufer has a B.S. degree in Outdoor Education, an M.S. in Therapeutic Herbalism, and is a graduate of the Virginia Department of Wildlife Resources (DWR) Outdoor Instructor Certification program. Shufer is also the owner of Wild Woods Farm, an 11-acre certified native nursery where she grows and sells native and medicinal plants and plant products. The farm serves as an outdoor classroom where she teaches others how to identify, harvest, and use wild plants for food and medicine. Shufer's an advocate for the very real benefits of forest bathing, and she's presented and published an academic paper on Dismal Swamp Ethnobotany at an Old Dominion University symposium.

The book is organized around a seasonal approach to foraging, where readers are encouraged to connect with nature in a more intentional way. Shufer weaves the science behind the use of plants for food and medicine throughout the text in a way that isn't intimidating, and that makes sense within the context of each chapter. The introductory chapters cover foraging ethics, plants to avoid, botany basics, plant features, and a plant identification primer. The chapters that follow showcase the availability of plants by season, along with selected recipes for teas, tonics, syrups, salads, juices, infusions, seasonings, and much more. Additional recipes are included in topic-specific sections.

Shufer is passionate about green cuisine, and she likes to view the kitchen as a laboratory of sorts where mindful cooks can experiment with mixtures of plant-derived seasonings in order to develop specific flavor profiles.

Readers will appreciate the 66 plants that Shufer features in the chapter

"Meet the Herbs". From field garlic and yaupon, to wild lettuce and redbud, each highlighted plant is accompanied by an illustration and the following information:

- Description
- Part used
- Preparation and uses
- Nutritional and medicinal benefits
- Taste profile
- Chemical constituents
- Growth profile/growing conditions/and how to harvest
- Safety precautions
- Nutritional glossary
- Recipe

If you're an angler, hiker, or hunter, this book will help you level-up your edible plant identification and outdoor survival skills. If you're interested in making a natural insect-repellant salve, Shufer shows you how. If you're looking for ways to integrate native plants into your diet, and you're jazzed by the prospect of black haw biscuits and blueberry walnut scones, then this book is for you.

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UPCOMING EVENTS

May 14
**World Migratory
Bird Day**
migratorybirdday.org/



May 21-27
**National Safe
Boating Week**
SafeboatingCampaign.com

May 21
**World Fish
Migration Day**
worldfishmigrationday.com/



June 20-26
Pollinator Week
pollinator.org/
pollinator-week

July 16
World Snake Day
snakes.ngo/wsd/



August 5-7
**39th Annual
Virginia Outdoor
Sportsman Show**
sportsmanshow.com/

September 23-25
**Virginia Hunter
Skills Weekend**
holidaylake4h.com/virginia-hunter-skills-weekend.html



OUT & ABOUT



DON'T FORGET!
**KIDS 'N FISHING
PHOTO CONTEST**

DEADLINE: October 7, 2022

For contest rules and requirements go to: virginiawildlife.gov/kidsnfishing

PICS FROM THE FIELD



Congratulations to **Kathleen Mills** of Fredericksburg for her delightful photograph of two red fox kits that live in her back yard with the rest of their family. Katie shot this with a Sony DSC-HX9V digital camera, ISO 640, 1/250, f/5.9. Adorable!

You are invited to submit up to three of your best photographs for possible publication in *Pics from the Field*. Please include contact information (email and phone number, city or county you live in) and send only high-resolution (minimum size, 4"x6" at 300ppi) jpeg, tiff, or raw files via email attachment, WeTransfer, or Dropbox to: Lynda.richardson@dwr.virginia.gov. We look forward to seeing your best work!

Restore the Wild Competition Winners Announced



FINE ART PRINT WINNER - VIRGINIA CANNICI

The Virginia Department of Wildlife Resources (DWR) is pleased to announce the winners of its annual Restore the Wild Artwork Competition. A panel of judges chose winners in the Fine Art Print, Youth, and "What Restore the Wild Means to Me" categories as the artwork to be used throughout 2022 to help promote Restore the Wild's mission. The artwork in the Fine Art and Youth categories portray the 2022 Restore the Wild species of focus, the loggerhead shrike, to help draw attention to the bird's need for expanded habitat.

"We are incredibly thankful to all of the talented artists who took the time to enter the competition—it was a joy to review so many lovely and creative works celebrating loggerhead shrike and other Virginia wildlife," said Restore the Wild committee member and DWR Watchable Wildlife Biologist Jessica Ruthenberg.



YOUTH WINNER - AVA CHIU

Virginia Cannici's watercolor and graphic pencil depiction of a loggerhead shrike topped the Fine Art Print category and will be reproduced as the new art print given as a gift to Restore the Wild's Golden Eagle level members. The winner of the Youth category of the competition, Ava Chiu, a high school student, created a gouache paint piece depicting a loggerhead shrike and its nest in a hawthorn tree. Al Bryan, created a winning piece that depicted "What Restore the Wild Means to Me" and includes a variety of Virginia native species. Jessica Wood's painting of a loggerhead shrike, which earned an Honorable Mention in the Fine Art Print category, will be reproduced in a commemorative Restore the Wild sticker given to all Restore the Wild members.



WHAT RESTORE THE WILD MEANS TO ME WINNER - AL BRYAN

the public that reflect Restore the Wild's mission to restore and create natural habitats vital to the survival of Virginia's wildlife. The subject focus of 2022's artwork is the loggerhead shrike, a state-threatened bird species that has been identified as a Tier 1 Species of Greatest Conservation Need in the Virginia Wildlife Action Plan. Judges evaluated the works not only on their artistic merit, but also on their precision in illustrating the species' physical characteristics and habitat, and their adherence to the theme of Restore the Wild.

The Restore the Wild committee was thrilled to see the quality and variety of entries in this year's Artwork Competition, which called for submissions from



FINE ART PRINT HONORABLE MENTION WINNER - JESSICA WOOD

Find out more about DWR's Restore the Wild initiative: virginiawildlife.gov/restore-the-wild

National Safe Boating Week

May 21-27, 2022



Virginia

The Boating Safety Seven

1. Wear your life jacket.
2. Take a boating safety class.
3. Carry all required safety gear.
4. Use your engine cut-off device.
5. File a float plan.
6. Be aware of weather and water conditions.
7. Boat sober, and be considerate of others.

SafeboatingCampaign.com



Virginia Department of
Wildlife Resources
P.O. Box 90778
Henrico, Virginia 23228

etition Winners Announce

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